RESULTS OF BANDING STUDIES OF THE BLACK VULTURE IN EASTERN NORTH AMERICA

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Basic information on the range, life history, and ecology of the Black Vulture, *Coragyps atratus*, has been known for many years (Bent, 1937), but except for a few specific studies dealing with food detection (Stager, 1964) and economic status (Parmalee, 1954) few additional data have been accumulated to supplement our knowledge of this species. The reasons for this are many even though the Black Vulture is a common bird in southeastern United States and one relatively easy to capture. The materials needed for trapping (large wire enclosures and obnoxious bait) and the general aversion to handling large numbers of a bird considered repugnant limit the number of investigators willing to undertake such studies.

In spite of these difficulties nearly 24,000 Black Vultures have been trapped, banded, and released during the last 30 years, most of them (approximately 22,600) from 1934 through 1946 by the late Edward A. McIlhenny of Avery Island, Louisiana. Considering the variety of species and the number of birds that he banded (189,298, according to Lowery, 1951), McIlhenny's contribution to ornithology is unique. He (1937; 1940a, 1940b; 1941, 1942) published some results of his bird-banding activities; these consisted usually of a list of species banded and the number of each with pertinent comments and descriptions of banding techniques. However, little use has been made of his vast accumulation of banding records in the form of comprehensive studies.

Our initial interest in the study of the Black Vulture was stimulated when one of us banded more than 600 of these birds during 1952 and 1953 in east Texas (Parmalee, 1954). This present study, based primarily on the banding records of E. A. McIlhenny, represents an evaluation of recoveries and trap-return data of this vulture in southeastern United States.

AVERY ISLAND AND E. A. McILHENNY

History and background. Avery Island, located five miles southwest of New Iberia, Iberia Parish, Louisiana, is not an island in the accepted sense but rather a prominent uplift surrounded by tide marshes. Geologically, it is one of three enormous salt plugs that occur along the Louisiana coast, presumably the result of an upheaval of salt deposits formed by evaporation of impounded sea water. Prior to this upheaval, silting and subsequent accumulations of decaying marsh vegetation produced a fertile topsoil that still covers the high knolls of Avery Island as well as the surrounding lowlands. Luxuriant stands of live oak, magnolia, sweet gum, and bald cypress predominate.

The banding of Black Vultures began in 1934 and continued through 1946; however, for some now unaccountable reason, none were banded in 1942, 1944, and 1945, and 1946 was the last year vultures were banded at Avery Island. Unfortunately, the vulture trap was not operated throughout the year; possibly the resulting data, particularly with reference to the extent and permanency of the local population, might have proved to be more comprehensive if year-round trapping had been done.

The following remarks by McIlhenny (1940a) are pertinent to an interpretation of data for trap returns and recoveries. "I band vultures only during late February and the first week of March in the spring, and late October to November

15th, in the autumn. The spring banding begins after the fur-trapping season ends in February, and closes when the vultures begin nesting in March. The fall banding begins in late October, one month before the fur-trapping season begins in November, and ends on 20 November. During the trapping season for fur animals, vultures feed on the carcasses of the animals killed for their skins, and scatter over a wide area of marsh and woodland to get this food. After the trapping season, they again take up their abode in the great vulture roost in the forest on the east side of Avery Island."

Actually, a few vultures were banded in all other months of the years (except June), but apparently the trap was in operation only occasionally during these few months, and not for the same weeks or months each year.

The only vulture trap used by McIlhenny was a large (16′ × 16′ × 9′) walk-in, wood-frame, wire-enclosed structure with a "V" type opening in the top of the larger of the two sections. After the birds had entered through the opening into the main section, they were driven into the smaller "holding" compartment (8′ × 14′ × 7′) through a one-way door. They were then removed, banded, and released at the trap. Data concerning the effect that a trap exerts on vultures or other species of birds in producing fear or wariness in some individuals after their first capture, or in actually serving as an attractive source of food for others, have often been conflicting. Some indication of this effect on vulture trapping at Avery Island was reflected in McIlhenny's comment (1940a) that "These birds seem to know days ahead of the time the vulture trap is to be set, and for a week or more before that time gather daily at the trap, perching on top and going inside, as if expecting food to be placed for them."

The effect of food in attracting vultures to an area has been mentioned by several authors. For example, McIlhenny (1939) described a not uncommon practice by Black Vultures of killing and eating skunks (*Mephitis mephitis*). During dry periods in the autumn when there was apparently little mortality of livestock (at Avery Island), vultures would congregate in areas where skunks were numerous. Local control of Black Vultures in Texas, instigated when depredation on livestock (especially lambs, pigs, and calves) became excessive, has been described by Parmalee (1954); the use of offal by one rancher as a fertilizer and mulch, which attracted a large number of vultures, was also discussed.

TRAP RETURNS

The Black Vulture is nonmigratory in the sense that there are apparently no periodic (seasonal) or established movements. Farner (1955) has presented three arbitrary population types with respect to variation in size. The first, "Stable populations or populations with random fluctuations" is applicable to *Coragyps atratus* since there is no evidence to suggest a population undergoing a gradual long-term increase or decrease in size (type 2) or one that is cyclic (type 3). Oberholser (1938) reported observations of variation in seasonal abundance, and Parmalee (1954) has discussed the effect of food in attracting unusual numbers of vultures to an area. But these factors, plus the effect of the nesting period in producing a certain degree of dispersal, are population fluctuations of a local nature.

Black Vultures apparently exhibit little caution in entering a trap at least once, and the presence of trapped individuals serves to attract others. Of the 22,621 Black Vultures banded by McIlhenny, 2382 (10.5 per cent) were retrapped at least once at Avery Island, and the average percentage of all returns (retraps)

TABLE 1

RETRAP DATA FOR BLACK VULTURES BANDED AT AVERY ISLAND, LOUISIANA, 1934–1946

Year banded	Total no. banded	Total no. returned	No. of individuals returning:								Per cent returned
			1	2	3	4	5	6	7	8	
1934	174	27	16	5	3	2	1				15.5
1935	786	141	99	22	6	6	4	2	1	1	17.9
1936	2010	230	168	37	13	9	3				11.4
1937	2388	414	296	63	36	12	6	1			13.2
1938	2456	347	273	53	16	5					14.5
1939	3220	572	446	90	35	1					17.8
1940	3505	427	341	68	16	2					12.2
1941	4782	189	182	6	1						4.0
1943	1900	35	35								1.8
1946	1400	0									
Totals	22,621	2,382	1,856	344	126	37	14	3	1	1	

of birds banded from 1934 to 1943 was 12.0 (table 1). One and one-half per cent of the banded vultures were retrapped twice, and only 0.05 per cent were retrapped three times. In a similar but more limited banding study of this species in east Texas, nearly 6 per cent of the vultures banded were retrapped a second time. One factor of special interest in the Texas study that lacks satisfactory explanation was the higher per cent (16.2) of returns of 123 vultures released 10 miles south of the trap (Parmalee, 1954). As I then pointed out, "If a local population existed, one might expect a higher percentage of recoveries from birds released at the trap than of those released some distance away, but such was not the case . . . ."

The data failed to show any consistency in the time interval between trap returns. As previously mentioned, McIlhenny operated the vulture trap primarily during October–November, and March–April; although there was a vulture roost at Avery Island, flux of birds in and out of this local area could not be ascertained with this one trap which was used only periodically. Operation of additional traps spaced at varying distances and directions from a center or base location, such as Avery Island, would probably provide more comprehensive data about wanderings and local movements. A development of trap wariness after the first capture and subsequently being handled may have been a prime factor in limiting the number of returns. Very few birds were trapped two or more times during the same month or during either the spring or the fall trapping periods. Considering only those vultures retrapped four or more times (together less than 0.03 per cent of the total returns), notable variation exists between the days, months, and/or years any one vulture was retrapped during the normal periods of trap operation. Possibly a certain time period must elapse after initial capture before a vulture will again enter a trap.

Of the 56 vultures retrapped four or more times, 28 per cent were retrapped at least once during each of the years between the first and last capture. Thirty of this group of 56 vultures were retrapped twice in at least one of the years, but all (except eight) were taken in either the spring or the fall trapping period; this represented an average of seven months between captures. It is impossible to know the location of these birds during the time between captures, but the number of

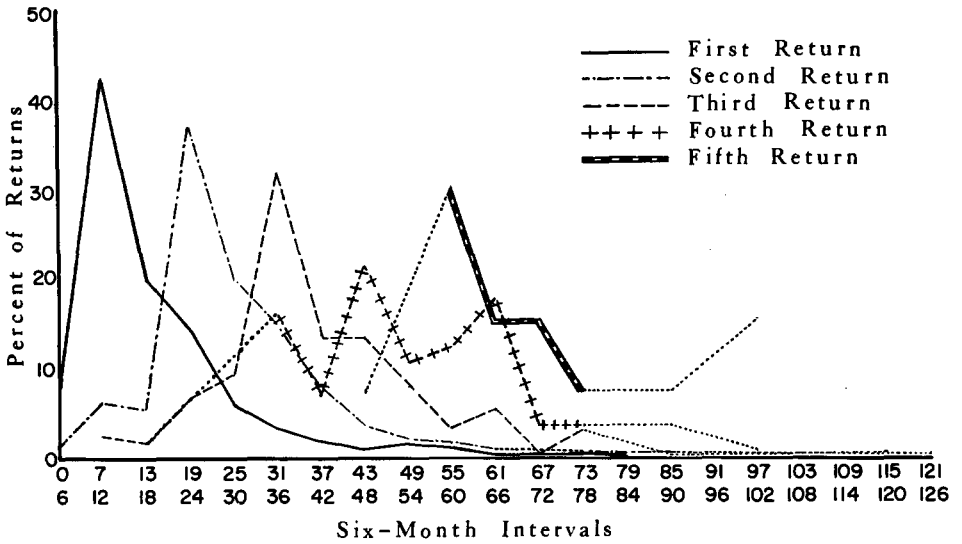

Figure 1. Percentage of returns by six-month intervals for Black Vultures retrapped one to five times. Dotted lines extending the symbols for fourth and fifth returns connect the few isolated returns at more than six-month intervals.

vultures retrapped at least four times suggests that some individuals remain in a local area for several years or that they return at frequent intervals. For example, of four Black Vultures banded on 8 November 1937, two were retrapped in October and two in November 1938, all in October 1939 and October 1940, and in November 1941; only one of the four was taken again, in February 1943.

In attempting to determine the time lapse between successive retraps, a graph (fig. 1) was plotted to show the percentage of returns for birds returning once, twice, three, four, and five times and the monthly intervals involved. From left to right, the first line represents 2382 returns, the second 517, the third 173, the fourth 56, and the fifth 14 returns. Seasonal or periodic use (February–March, October–November) of the trap by McIlhenny probably influenced the periodicity of returns, producing sharp apices rather than possibly more rounded peaks if the trap had been operated monthly and the returns were distributed over a longer time. However, some conclusions may be made from these restricted data.

Approximately 42 per cent of the vultures retrapped only once were taken one year after the original banding date. Thirty-seven per cent of the birds returning a second time were retrapped 18 to 24 months after they had been banded, and 32 per cent of the third return individuals were retrapped three years after banding. Of these birds that returned once, twice, or three times, the interval between the banding date and the first return and consecutive returns was one year, followed by a rapid decline in the percentage of retraps. Of the individuals retrapped only once, 85 per cent returned within two years; of those retrapped twice, 84 per cent returned within three years; and of those retrapped three times, 78 per cent returned within four years.

The numbers of Black Vultures retrapped four (37) and five (14) times were extremely small, and the paucity of records probably accounts for irregularities in percentage of returns and time intervals. Birds retrapped four times showed a peak

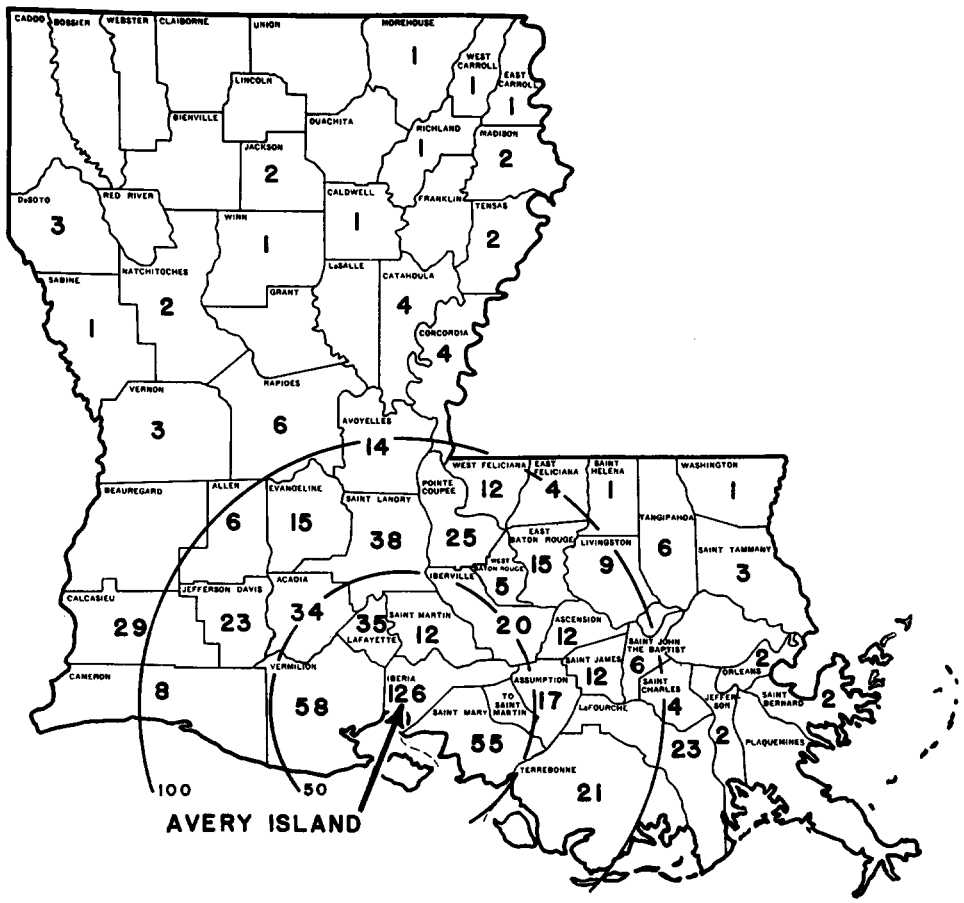

Figure 2. Numbers of Black Vultures, banded at Avery Island, recovered in Louisiana parishes. Circular segments indicate distances of approximately 50 miles and 100 miles from Avery Island.

return (21 per cent) during the 43–48 month period, although 16 per cent had returned in 31–36 months from band date while 18 per cent returned during the six- to six-and-a-half-year period. A few of the vultures retrapped one to four times were recaptured soon (one week to several months) after the date of banding, but the minimum time interval for a bird retrapped for the fifth time was 47 months from the date it was banded.

RECOVERY OF BLACK VULTURES BANDED AT AVERY ISLAND

Approximately 840 Black Vultures banded at Avery Island were recovered, 65 of them in seven states other than Louisiana and 740 in Louisiana. However, only 584 recoveries in Louisiana could be located (fig. 2) as to the parish where they were taken; 156 of the reports submitted to the Bird Banding Office were equivocal with reference to point of recovery. Thirty-five reports simply listed a banded vulture as shot, trapped, or found, but included no other data.

The method or circumstance of recovery was also often vague, and the termi-

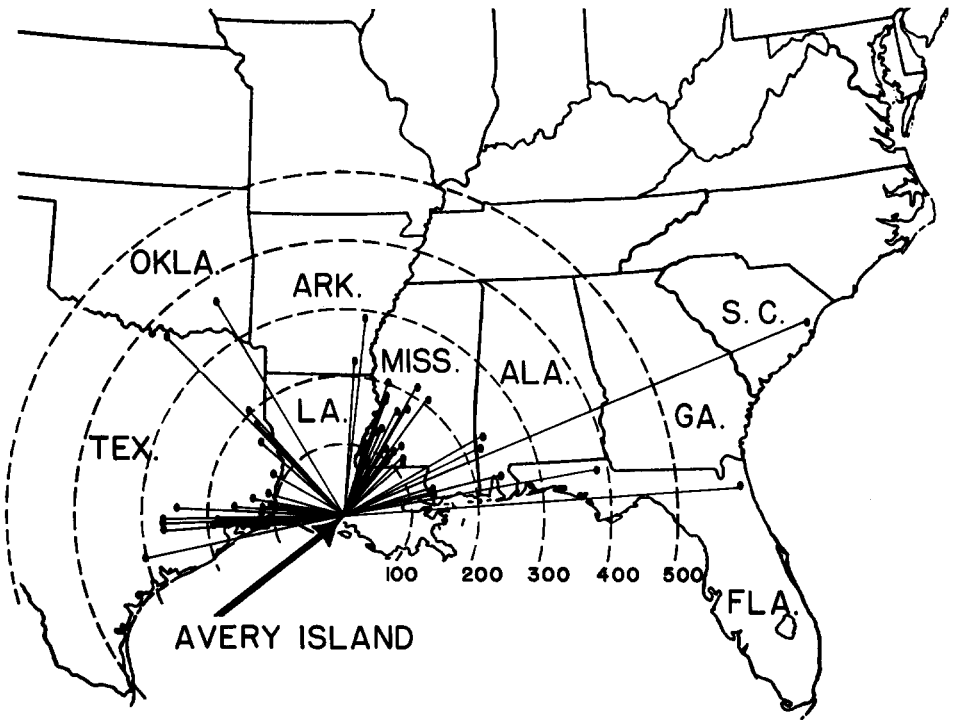

Figure 3. Locations of Black Vultures, banded at Avery Island, recovered outside of Louisiana. Circular segments indicate distances in miles from Avery Island, scale at lower right.

nology used by individuals reporting a banded vulture was ambiguous. In an attempt to determine the usual manner by which most vultures were taken, the following generalized categories were established from submitted recovery sheets: shot 90; caught in steel trap 253; killed 143; found dead 214; killed by vehicle 7; miscellaneous and unknown 133. The majority were shot or trapped. In all probability, most of those reported as "killed" were shot; vultures are protected by law in Louisiana, and there may well have been a certain hesitancy on the part of some individuals to state that they had shot a vulture.

Fur trapping in the vicinity of Avery Island and in the coastal marshes of Louisiana was an important occupation. An animosity developed toward vultures because the birds would on occasion destroy trapped animals (particularly muskrats) before the trapper could retrieve them. Numerous Black Vultures were caught in steel traps, presumably attracted by trapped mammals and to "the carcasses of the animals killed for their skins" (McIlhenny, 1940a).

The extensive banding program carried on by McIlhenny was well known to the rural populace of Iberia and neighboring parishes, and this may have been a factor influencing trappers and hunters to examine birds for bands. How effective this knowledge was in actually inducing them to report banded birds is a matter of conjecture. Records for which there are sufficient recovery data show that only 3.55 per cent of all Black Vultures banded at Avery Island were recovered, and of this total, 3.27 per cent were taken in Louisiana. About 84 per cent of the recoveries in Louisiana occurred within a 100-mile radius of Avery Island, and considering

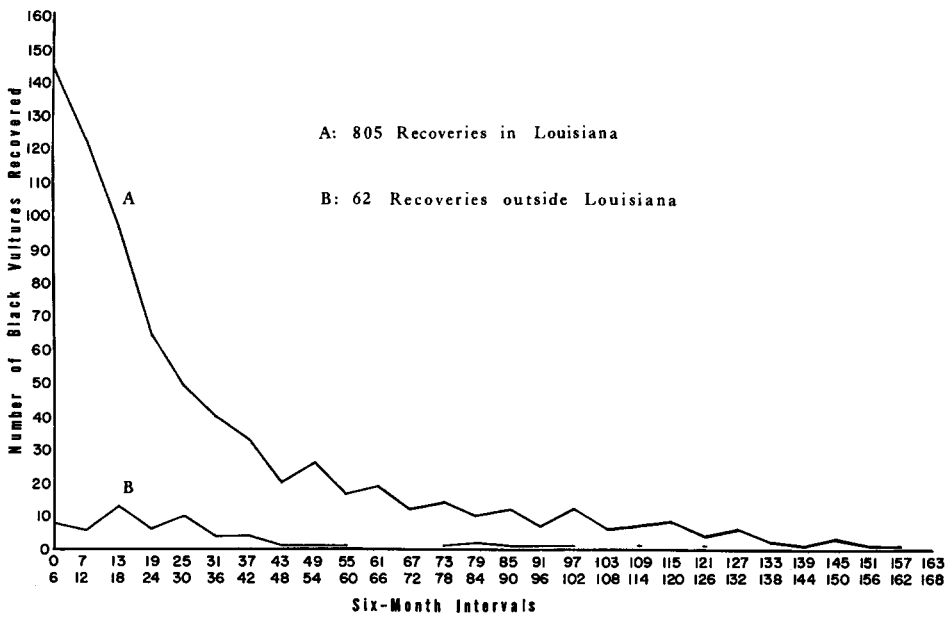

Figure 4. Number of Black Vultures recovered at six-month intervals following the date of banding ("zero" time).

all records from all states (figs. 2 and 3), 97 per cent of the recoveries took place within a 200-mile radius of the banding locality. Again, although local knowledge of the banding program at Avery Island may have influenced the number of recoveries reported, these data suggest that the majority of Black Vultures in a given population or area restrict their movements and local wanderings within a 200-mile radius.

Assuming that the Gulf of Mexico is a barrier to any extensive southward wanderings, recoveries of vultures in Louisiana and neighboring states (figs. 2 and 3) showed predominant movements directly west (Texas) and north-northeast (Mississippi) from the point of banding. However, recoveries outside Louisiana represent less than 1 per cent of the total; only through an intensive study using a series of vulture traps established in a circular pattern and by marking (painting) a large number of birds which could be easily recognized would it be possible to determine distance and direction of movements.

Data in figure 4 show that approximately half (52 per cent) of the Black Vultures recovered in Louisiana were obtained within two years after banding. Between two and four years from the banding date, 19 per cent were recovered, and between four and six years, 10 per cent. The remaining 19 per cent of the recoveries occurred in a gradual decline over a period ranging from six years after banding to 13½ years. Cooke (1950) reported two recoveries of Black Vultures banded at Avery Island after 7 and 11 years. Of all the vultures banded at Avery Island, the last recovery date was 15 January 1952, 10 years after the bird was banded. The longest time between banding date and recovery was 13 years, a bird (39-801349) banded 1 November 1938 and trapped 15 November 1951. Compared with the recoveries in Louisiana, it is of interest that of the vultures taken in other states, approximately half (51 per cent) were also recovered within two years after banding, and 29 per cent between two and four years.

TABLE 2

RECOVERIES OF BLACK VULTURES BANDED 1934–1946 AT AVERY ISLAND, LOUISIANA

Year banded	Total no. banded	Total no. of recoveries	Per cent of no. banded
1934	174	18	10.3
1935	786	66	8.4
1936	2010	167	8.3
1937	2388	80	3.3
1938	2456	100	4.1
1939	3220	109	3.4
1940	3505	106	3.0
1941	4782	98	2.0
1943	1900	43	2.3
1946	1400	18	1.3
Totals	22,621	805	

As shown in table 2, recoveries were highest (average of 9 per cent) for those birds banded during the first three years (1934–36) that the trap was in operation. As pointed out before, local knowledge of the extensive banding program carried on by McIlhenny may have been an influencing factor in making individuals conscious of banded birds and in reporting them. Also, fur trapping was at its height during the late 1930's, and because of the vulture's habit of feeding on trapped animals and discarded carcasses and themselves being caught in steel traps, trappers would come into more direct contact with them (shooting; removing from traps). With regard to recognizing bands on vultures, the fact that many of the bands become completely covered with fecal matter in time and "... would certainly go unobserved unless an individual was specifically looking for bands" (Parmalee, 1954) probably resulted in many banded individuals being overlooked.

RECOVERY OF BLACK VULTURES BANDED IN STATES OTHER THAN LOUISIANA

Since 1953 only 15 Black Vultures have been banded in the United States; none of these birds has yet been recovered. Before 1953, Black Vultures had been banded in six states other than Louisiana, but the total number of birds is small compared with those banded at Avery Island (table 3).

Of the 992 Black Vultures banded in these six states, 3.7 per cent were recovered, this being approximately the same percentage of recoveries for birds banded at Avery Island. The two recoveries of vultures banded in Indiana and Ohio occurred within a year after release, and both were less than 20 miles from the banding station. The one recovery of a Black Vulture banded in North Carolina represented an interval of 23 months and a distance of only five miles. Except for one Tennessee record (the band found "somewhere in Tennessee" 32 months after banding), the other four recoveries of vultures banded near Murfreesboro occurred within one year and 25 miles of the banding location.

Lincoln (1936) mentions several bird-banding cooperators who "... more or less specialized on the birds of prey, ..." and, among others, refers to E. A. McIlhenny and Victor Coles of Hampton, Virginia, and lists 10 recoveries of Black Vultures banded by them. Eleven of the 15 recoveries of *C. atratus* banded by Victor Coles occurred within 50 miles north-northwest of Hampton; the time interval varied from

TABLE 3

SUMMARY OF DATA FOR BLACK VULTURES BANDED IN STATES OTHER THAN LOUISIANA

State	Approximate banding locality	Date	No. banded	No. of recoveries
Indiana	Cambellsburg	1935, 1949	4	1 (25.0%)
North Carolina	New Holland	1938	9	1 (11.1%)
Ohio	Sugar Grove	1936–37	12	1 (8.3%)
Tennessee	Murfreesboro	1937–42	117	6 (5.1%)
Texas	Austin	1930–32	25	1 (4.0%)
	Nacogdoches	1952–53	604	12 (2.0%)
Virginia	Hampton	1934–35	221	15 (6.8%)
		Totals	992	37

2 to 68 months. One bird was taken at Farmville, Virginia, approximately 120 miles west-northwest of Hampton (40 months) and one at Raleigh, North Carolina, 120 miles southwest (12 months). As in the case of recoveries of Black Vultures banded at Avery Island, there is no correlation between the distance or direction of travel and the time interval from date banded to recovery.

Two of the 12 recoveries of vultures banded by the senior author near Nacogdoches, Texas, occurred in Union and Webster parishes, Louisiana, an average distance of 130 miles northeast of the banding station and a time interval of 3½ and 37 months, respectively. The other recoveries were made in or near Nacogdoches (3) or at varying distances from 15 to 135 miles in all directions. Of the 25 Black Vultures (juveniles) banded at Austin, Texas, by Homer R. Bolen, the one recovery took place in that city eight months after banding. The vulture covering the greatest distance in the shortest period of time was a bird (34-645211) banded at Avery Island, Louisiana, 11 April 1936 and recovered (shot) the same day in Orange County, Texas, about 125 miles away. Only five of the 146 Black Vultures banded as juveniles ("nestling, fledgling, immature") were recovered, and although the comparative data (number of banded "adults" vs. juveniles) are scanty, there is no indication of higher mortality in this age group.

SUMMARY

Approximately 23,700 Black Vultures have been banded in eastern North America, the majority (95 per cent) at Avery Island, Louisiana by the late E. A. McIlhenny. Of the 2382 vultures returning (retraps) to the Avery Island station, 10.5 per cent were retrapped at least once; however, only a small per cent (1.5) were retrapped twice—followed by an even sharper decline in the number of birds returning three or more times. Since McIlhenny operated the trap primarily during early spring and late fall, conclusions regarding the stability of the local population throughout the year are limited. These data suggest that, after initial capture, the majority of individuals may develop a shyness or fear of the trap which few overcome. An average time interval of seven months occurred between subsequent recaptures, indicating that possibly a certain prolonged period was necessary for some vultures to "forget" the experience of being trapped and handled. Very few birds were trapped within one or two months after the initial capture. However, retrapping of individuals (some, several times) banded from one to 11 years previously suggests that a certain number may remain in a very local area for indefinite periods. The degree

and extent of mixing, movement, or wandering by individuals within an area or population has yet to be ascertained.

Based on the nearly 875 recovery records of Black Vultures, no correlation was evident between the distance traveled and the time interval from banding date to recovery. Three and one-half per cent of the vultures banded at Avery Island were recovered, 97 per cent of them within a 200-mile radius and half of them within two years after banding. Only six vultures banded at Avery Island were taken more than 300 miles from the banding station; the two greatest distances traveled were by individuals reported from Georgetown County, South Carolina (only the band found), and St. Johns County, Florida (found dead), approximately 720 and 600 miles, respectively. The available evidence indicates that many individuals within a local population or region wander over an area of considerable size, probably within a 100- to 200-mile radius, and occasional fluctuations in local abundance are influenced by food supply.

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